BARNES & THORNBURG
600 One Summit Square
Fort Wayne, Indiana 46802
(260) 423-9440

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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First Named Inventor:	Steven M. Reynolds, *et al.*
Group Art Unit:	2863
Examiner Name:	Tung S. Lau
Title:	PUMP AND METHOD FOR FACILITATING MAINTENANCE AND ADJUSTING OPERATION OF SAID PUMP

Certificate Under 37 CFR 1.8(a)

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on October 15, 2003

Gregory S. Cooper

APPEAL BRIEF

Mail Stop Appeal Briefs-Patents
Commissioner of Patents
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Alexandria, VA 22313-1450

Sir:

A Notice of Appeal was filed in this application in accordance with 37 CFR §1.191 on July 22, 2003. This Appeal Brief is filed in accordance with 37 CFR §1.192. The requisite fee of $330.00 accompanies this brief pursuant to 37 CFR §1.17(f). Filed concurrently

with this Appeal Brief is a Petition for Extension of Time, along with the requisite fee of $110.00 for such one month extension of time request, pursuant to 37 CFR § 1.17(a)(1). Please credit any overpayment or charge any additional fees to the Deposit Account of Barnes & Thornburg, Account Number 02-1010 (28908/82353).

REAL PARTY IN INTEREST

Applicants have assigned their interest in this case to Warren Rupp, Inc. (hereinafter "Appellant"), the assignment being recorded in the United States Patent and Trademark Office on February 14, 2002, at Reel 010858, Frame 0850.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant or Appellant's legal representative which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF THE CLAIMS

Claims 1-4, 6-12, 15-22, 25-28, 30-35, 37-39, 47, 48, 50, 51 and 53 are rejected under 35 U.S.C. 103(a) over Miller in view of Garrett *et al.* Claims 5, 13, 14, 23, 24, 29 and 36 are objected to and indicated as allowable if placed in independent form.

The Final Office Action has a single rejection under 35 U.S.C. 103(a) wherein Claims 1-4, 6-12, 14-28, 30-35, 37-39, 47, 48, 50, 51 and 53 are listed in the heading of the rejection. Each of these claims, except for Claims 14, 23 and 24 are referred to in the body of the rejection. Claims 14, 23 and 24 are included among the claims indicated as having allowable subject matter (Final Office Action at page 4). In view of the indication of allowability of these claims at page 4 of the Office Action and the omission of these claims from the explanation of the rejection, Appellant consider Claims 14, 23 and 24 to not be subject to the rejection.

STATUS OF AMENDMENTS

No amendments have been filed in this application subsequent to the Final Office Action mailed on April 21, 2003. All previous amendments have been entered, and are incorporated in the text of the claims as they appear in Appendix A to this Appeal Brief.

SUMMARY OF THE INVENTION

The following summary is provided in accordance with MPEP §1206. Consistent with MPEP §1206, the following summary does not in any manner whatsoever limit the claim interpretation. Rather, the summary is provided only to facilitate the Board's understanding of the subject matter of the appeal.

The present invention is directed to a pump (see Claims 31 through 35, 37 through 39, 47, 51 and 53) and a method of facilitating maintenance of a pump (see Claims 1 through 30, 48 and 50). The pump (1) comprises at least one wear part (34), a processor (12) and memory, at least one acoustical sensor (page 11, lines 14 through 17) for sensing at least one operating condition of the pump (1), and a display (80). The acoustical sensor communicates operational data reflective of the sensed operating condition to the processor (12). The processor (12) stores the operational data in the memory and updates the stored operational data upon receipt of new operational data from the sensor. The memory also comprising parts identification data, identifying wear parts of the pump and at least one predetermined level of operational information. The processing compares the stored predetermined level to the stored operational data and in dependent response thereto, outputting information to the display as to the desirability of replacing or repairing at least one selected wear part. (See Figs. 3 and 4.)

The method of facilitating maintenance of a pump, according to Claim 1, for example, comprises the following steps: providing a pump including wear parts (34), a processor (12) and memory; sensing at least one structural operating behavior of the pump indicative of the operation of the pump (page 11, lines 14 through 17, for example); generating operational data reflective of the sensed operating behavior; storing the generated operational data in the memory;

storing parts identification data, identifying wear parts of the pump in the memory; storing at least one predetermined level of operational information; operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto, outputting information as to the desirability of replacing or repairing at least one selected wear part. (See, also, Figs. 3 and 4.) For purposes of this appeal, independent Claim 17 is considered similar to Claim 1 with the exception of the limitation of the "acoustical generating operating condition" which replaces the "structural operating behavior" of Claim 1. Claim 48 is, too, similar to Claims 1 and 17, except for the limitation of the "acoustic signature signal" which is not a limitation of either Claims 1 or 17.

ISSUES

The issue presented in this appeal is whether Claims 1-39, 47, 48, 50, 51 and 53 are obvious under 35 USC §103(a) under Miller (United States Patent No. 5,563,351) in view of Garrett, *et al.* (United States Patent No. 4,951,271).

GROUPING OF CLAIMS

For the reasons set forth herein, Appellant considers the appealed claims to be separately patentable. Accordingly, Claims 1-4, 6-12, 15-22, 25-28, 30-35, 37-39, 47, 48, 50, 51 and 53 do not stand and fall together, and each claim should be assessed in view of its respective limitations.

ARGUMENT

All of the rejected claims are believed to be patentable over the combination of Miller and Garrett *et al.* because this combination fails to establish a *prima facie* case of obviousness over the claims. Specifically, the combination fails to provide any suggestion or motivation to modify or combine their teachings to render the claimed invention obvious. Additionally, the combination was formed solely through improper hindsight reasoning in order

to reconstruct the claimed invention. Lastly, the combination renders the prior art unsatisfactory for its intended purpose, as well as fails to establish a likelihood of success that the claimed invention will be produced.

I. The Differences Between Claim 1 and the Relied on Prior Art.

Miller is directed to an apparatus and method for detecting wear in a pump. The apparatus includes a case drain connected to the pump case, a flow sensor for producing signals indicative of case drain flow, a processor for determining whether pump wear has exceeded a predetermined level and for indicating a fault in response to the pump wear exceeding the predetermined level. The method steps are measuring the flow of fluid in the case drain, comparing the flow to a predetermined constant, and indicating a fault in response to the flow exceeding the predetermined constant. (See, especially, col. 2, lines 1-13).

Garrett *et al.* discloses an acoustical sensor. The Final Office Action at page 4 states that:

> Garrett discloses the acoustical sensor communicating operational data reflective of the sensed operating condition to the processor (col. 2, lines 19-48), and the signal is vibratory (col. 2, lines 19-22), in order to have a low cost very simple construction and highly sensitive system (col. 1, lines 9-20), col. 2, lines 19-22).

Garrett *et al.* does not disclose an "acoustical sensor communicating operational data reflective of the sensed operating condition to the processor." Column 2, lines 19-48 does not mention a processor. Garrett *et al.* does not disclose a "highly sensitive system." Column 1, lines 9-20 are directed to a sensor, not a system.

Appellant' Claim 1 is directed to a method of facilitating maintenance of a pump comprising the following steps: providing a pump including wear parts, a processor and memory; sensing at least one structural operating behavior of the pump indicative of the operation of the pump; generating operational data reflective of the sensed operating behavior; storing the generated operational data in the memory; storing parts identification data identifying wear parts of the pump in the memory; storing at least one predetermined level of operational information;

operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part.

The Claim 1 step of operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part is not taught or suggested by Miller. In Miller "data for which warnings are to be produced are only examined while the pump is in a predefined operating state." (See col. 3, lines 28-30). Miller specifically discloses that:

> If the pump is in the standard operating state, the flow rate of fluid in the case drain 24 is calculated 104 in response to the signals from the venturi pressure sensors 36,38 in a manner well-known in the art of fluid dynamics. The calculated flow rates are stored in a memory device (not shown) associated with the microprocessor 28. The stored flow rates are then used to derive a best-fit equation using a standard regression technique such as least-squares. The best-fit equation is used to calculate the rate of change in the magnitude of case drain flow at block 106. The rate of change is also stored in memory. If either the flow or the rate of change of flow exceed respective constants, the microprocessor 28 produces an electrical signal to indicate a fault at block 110.

(See col. 3, lines 38-52).

Thus, Miller does not operate a processor to compare data and output information as to the desirability of replacing or repairing at least one selected wear part as recited in Appellant' Claim 1.

Appellant' Claim 1 recites storing data identifying wear parts of the pump in the memory. In the final step of Claim 1 this wear part data is compared to like data recited in the step of sensing at least one structural operating behavior of the pump indicative of the operation of the pump. Comparison of sensed wear on one or more structural pump parts with stored wear part data in the processor is not taught or suggested by Miller. Miller measures flow in the case drain and calculates flow rate change which is used to decide on the need to replace or repair.

Appellant' Claim 1 process will determine which part is wearing. Miller's process only shows that something is wearing.

The Garrett *et al.* disclosure of an acoustical sensor does not recite any steps for use of the sensor. There is nothing in Garrett *et al.* that would suggest use of the Garrett *et al.* sensor in a method as recited in Appellant' Claim 1. Obviousness cannot be established by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done. See *Ex parte Levengood*, 28 USPQ2d 1300 (BPAI 1993). It is the prior art which must provide one of ordinary skill in the art the motivation to make the proposed modifications needed to arrive at the claimed invention (see *In re Lalu*, 747 F.2d 703, 223 USPQ 1257 (Fed. Cir. 1984)). There is nothing in Miller that would have suggested using the Garrett *et al.* sensor and there is nothing in Garrett *et al.* to suggest using his sensor in the process of Miller. Even if the Garrett *et al.* sensor were used to sense the case drain flow in Miller (and this is not conceded) this would not result in the process of Appellant' Claim 1 which requires operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part. There is nothing in either Miller or Garrett *et al.* that teaches or suggests this step or the combination of steps as recited in Claim 1.

II. Dependent Claims 2-4, 6-12 and 15-16 and the Relied on Prior Art.

Claim 2 further modifies Claim 1 by adding sensing at least one operating condition of the pump indicative of the operation of the pump, generating operational data reflective of the sensed operating condition, storing the operational data in the memory, and thereafter updating the stored operational data in dependent response to the sensing of the at least one operating condition. Thus, Claim 2 modifies Claim 1 by adding an additional sensing of yet another operating condition. Miller senses only one condition, case drain flow, not two as in Appellant' Claim 2. Miller and Garrett *et al.* does not teach or suggest the combination of steps as recited in Appellant' Claim 2.

Claim 3 further modifies Claim 1 by adding retrieving parts identification data for the at least one selected part from the memory, and outputting information identifying the at least one part whose replacement or repair is desired. Thus, Claim 3 modifies Claim 1 by adding the step of retrieving data for at least one selected part and outputting that data. Miller does not retrieve or output information for any part. Miller and Garrett *et al.* do not teach or suggest the combination of steps as recited in Appellant' Claim 3.

Claim 4 further modifies Claim 1 by adding that the pump comprises a pumping element and the structural operational behavior of the sensing step is a physical integrity of the pumping element of the pump. Miller does not teach or suggest a sensing step as recited in Claim 4 and Miller and Garrett *et al.* taken together do not teach or suggest the combination of steps as recited in Appellant' Claim 4.

Claim 6 further modifies Claim 2 by adding that the pump comprises a check valve and the operational condition of the sensing step is a reverse fluid flow through the check valve. Miller senses only case drain flow. Miller does not teach or suggest a sensing step as recited in Claim 6 and Miller and Garrett *et al.* taken together do not teach or suggest the combination of steps as recited in Appellant' Claim 6.

Claim 8 further modifies Claim 2 by adding operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of modifying the operation of pump. Modification of the operation of the pump is described at, for example, page 11, lines 22-23 wherein adjusting the speed of the pump is taught. Miller does not teach or suggest modifying the operation of the pump as recited in Claim 8 and Garrett *et al.* does not teach or suggest this omission.

Claims 9 through 11 modify Claim 8 by adding that the operating condition of the sensing step is an output flow rate of the pump, a cycle rate of the pump and an acceleration of a cycle rate of the pump, respectively. Miller senses case drain flow not output, cycle rate or acceleration of a cycle rate as recited in Claims 9 through 11 and Garrett *et al.* does not make up for this omission.

Claim 12 modifies Claim 1 by adding that the structural operational behavior of the sensing step is a temperature of the pumping element of the pump. Miller senses inlet temperature and discharge pressure in the predefined operating state. Miller does not have a sensing step as recited in Claim 12 of temperature of the pumping element of the pump. Garrett *et al.* does not make up for this omission.

Claims 14 through 16 modify Claim 8 by adding that the operational condition of the sensing step is a backpressure in the air chamber, filling rate of the pumping chamber and suction pressure of the pump, respectively. Miller does not teach or suggest a sensing step as recited in Claims 14 through 16 and Garrett *et al.* does not make up for this omission.

III. The Differences Between Claim 17 and the Relied on Prior Art.

Appellant' Claim 17 is directed to a method of modifying an operation of a pump comprising the following steps: providing a pump, a processor and memory; sensing at least one acoustical signal generating operating condition of the pump indicative of the operation of the pump with an acoustical signature sensor; generating operational data reflective of the sensed operating condition; storing the generated operational data in the memory; storing at least one predetermined level of operational information; operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of modifying the operation of pump.

The Claim 17 step of sensing at least one acoustical signal generating operating condition of the pump indicative of the operation of the pump with an acoustical signature sensor is not taught or suggested by Miller. Modifying the operation of the pump is also not disclosed in Miller. In Miller, case drain flow is sensed by venturi pressure sensors 36, 38. (see col. 3, lines 38-42). The Miller process is designed for venturi pressure sensors, not acoustical sensors. There is nothing in Miller to suggest that it would have been obvious to use acoustical sensors. Garrett *et al.* does not suggest any use of their acoustical sensor much less in a pump as suggested by the Appellant.

The combination of steps in Claim 17 is not taught or suggested by Miller, Garrett *et al.* or the combination of Miller and Garrett *et al.* Sensing the acoustical signal generating operating condition, storing and operating the processor to compare the stored operational data enables modifying the operation of the pump. Miller produces a fault indication such as a warning light, etc. (see col. 4, lines 16-20). Miller, however, does not modify the operation of the pump based on steps of sensing an acoustical signal... as recited in Appellant' Claim 17.

IV. Dependent Claims 18, 19-22, 27-28 and 30 and the Relied on Prior Art.

Claim 18 further modifies Claim 17 by adding sensing at least one operating condition of the pump indicative of the operation of the pump, generating operational data reflective of the sensed operating condition, storing the operational data in the memory, and thereafter updating the stored operational data in dependent response to the sensing of the at least one operating condition. Thus, Claim 18 modifies Claim 17 by adding an additional sensing of yet another operating condition. Miller senses only one condition, case drain flow, not two as in Appellant' Claim 18. Miller and Garrett *et al.* do not teach or suggest the combination of steps as recited in Appellant' Claim 18.

Claims 19 through 21 modify Claim 18 by adding that the operational condition of the sensing step is an output flow rate of the pump, a cycle rate of the pump and an acceleration of a cycle rate of the pump, respectively. Miller senses case drain flow not output, cycle rate or acceleration of a cycle rate as recited in Claims 19 through 21 and Garrett *et al.* does not make up for this omission.

Claim 22 modifies Claim 18 by adding that the structural operational behavior of the sensing step is a temperature of the pumping element of the pump. Miller senses inlet temperature and discharge pressure in the predefined operating state. Miller does not have a sensing step as recited in Claim 22 of temperature of the pumping element of the pump. Garrett *et al.* does not make up for this omission.

Claim 27 modifies Claim 18 by adding that the steps of storing parts identification data identifying wear parts of the pump in the memory; and operating the processor to compare

the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part. Miller does not disclose steps for replacing a selected wear part. Miller produces a fault indication, but this is not indicative of any specific wear part. Garrett *et al.* does not make up for this omission.

Claims 28 and 30 modify Claim 27 by adding that at least one wear part is a pumping element (Claim 28) or check valve (Claim 30) and the operational condition of the sensing step is a physical integrity of the pumping element (Claim 28) or a reverse fluid flow through the check valve (Claim 30). Miller does not disclose any sensing step of the physical integrity of the pumping element or of a reverse fluid flow through the check valve. Miller produces a fault indication, but this is not indicative of the physical integrity of the pumping element or of a reverse fluid flow through the check valve. Garrett *et al.* does not make up for this omission.

V. The Differences Between Claims 39, 47, 48, 50, 51 and 53 and the Relied on Prior Art.

Claim 39 is directed to a pump comprising: at least one wear part, a processor and memory, at least one sensor for sensing at least one acoustical signal generating operating condition of the pump, and a display, the sensor communicating operational data reflective of the sensed operating condition to the processor, the processor storing the operational data in the memory and updating the stored operational data upon receipt of new operational data from the sensor, the memory also comprising parts identification data identifying wear parts of the pump and at least one predetermined level of operational information, the processor comparing the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part modifying the operation of the pump.

Miller has a pump, a processor and memory, but does not teach or suggest any of the following: 1) at least one sensor for sensing at least one acoustical signal generating

operating condition of the pump; 2) the sensor communicating operational data reflective of the sensed operating condition to the processor, the processor storing the operational data in the memory and updating the stored operational data upon receipt of new operational data from the sensor; 3) memory also comprising parts identification data identifying wear parts of the pump and at least one predetermined level of operational information; and 4) the processor comparing the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part modifying the operation of the pump. As noted above, the Miller apparatus produces a fault indication only, there is no suggestion of apparatus replacing or repairing selected wear part(s). None of items 1 through 4 would have been obvious from Miller taken alone or in combination with Garrett *et al.*

Claim 47 depends from Claim 39 and is allowable at least for the reasons noted at items 1) through 3) above and further because Miller, taken alone or in combination with Garrett *et al.*, does not teach or suggest a pump as in Claim 39 wherein the processor compares the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part.

Claim 51 is directed to a pump comprising: at least one wear part, a processor and memory, at least one sensor for sensing at least one acoustical signature signal of the pump, and a display, the sensor communicating the sensed signature signal to the processor, the processor storing the signature signal in the memory and updating the stored signature signal upon receipt of a new signature signal from the sensor, the memory also comprising parts identification data identifying wear parts of the pump at least one predetermined signature signal, the processor comparing the stored predetermined signature signal to the stored signature signal and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part.

Miller's pump, processor and memory, is lacking: 1) at least one sensor for sensing at least one acoustical signature signal of the pump, and a display; 2) a sensor

communicating the sensed signature signal to the processor, the processor storing the signature signal in the memory and updating the stored signature signal upon receipt of a new signature signal from the sensor; 3) a memory also comprising parts identification data identifying wear parts of the pump at least one predetermined signature signal; and 4) processor comparing the stored predetermined signature signal to the stored signature signal and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part. Miller's fault indication apparatus does not suggest apparatus replacing or repairing selected at least one wear part. None of items 1 through 4 would have been obvious from Miller taken alone or in combination with Garrett *et al.*

Claim 53 is dependent on Claim 51 and further requires the signature signal is a vibratory signal. A vibratory signature signal in combination with the pump of Claim 51 is not taught or suggested by Miller and would not have been obvious from Miller taken alone or in combination with Garrett *et al.*

Claim 48 is directed to a method of facilitating maintenance of a pump comprising the following steps: providing a pump including wear parts, a processor and memory; sensing at least one acoustic signature signal of the pump indicative of the operation of the pump; storing the sensed signature signal in the memory; storing parts identification data identifying wear parts of the pump in the memory; storing at least one predetermined signature signal; operating the processor to compare the stored predetermined signature signal to the stored sensed signature signal and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part.

The Claim 48 step of sensing at least one acoustic signature signal of the pump indicative of the operation of the pump is not taught or suggested by Miller. Outputting information as to the desirability of replacing or repairing at least one selected wear part is also not disclosed in Miller. Miller provides a fault indication without the use of at least one acoustic signature signal and without outputting information as recited in Claim 48. Miller and Garrett *et al.* taken alone or in combination would not have suggested the specific steps of Claim 48.

Claim 50 further modifies Claim 48 by providing the signature signal is a vibratory signal. This additional limitation would not have been obvious from a combination of Miller and Garrett *et al.*

VI. The References Fail to Provide any Suggestion or Motivation to Combine Their Teachings

The Examiner asserts that motivation exists to combine the teachings of Miller and Garrett, *et al.* to produce a pump having an acoustical sensor that detects the noise a wear part makes. In an Advisory Action mailed June 27, 2003, the Examiner stated that:

> the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The Examiner then concludes that "both Miller and Garrett discloses a system to detect vibration and wear of the system . . . ." The motivation for combining the references, according to the Examiner, is found in column 3, lines 38-49, of Miller, and column 1, lines 5-7, of Garrett, *et al.* Column 3, lines 38-49, of Miller states:

> If the pump is in the standard operating state, the flow rate of fluid in the case drain 24 is calculated 104 in response to the signals from the venturi pressure sensors 36, 38 in a manner well-known in the art of fluid dynamics. The calculated flow rates are stored in a memory device (not shown) associated with the microprocessor 28. The stored flow rates are then used to derive a best-fit equation using a standard regression technique such as least-squares. The best-fit equation is used to calculate the rate of change in the magnitude of case drain flow at block 106. The rate of change is also stored in memory.

According to the Examiner, that text provides motivation to combine with the text of column 1, lines 5-7, of Garrett, *et al.* which states:

1. Field of the Invention

This invention relates to acoustic vibration sensing apparatus having a light transmitting fiber.

Clearly, no nexus exists between the flow meter of Miller and the flextensional hydrophone of Garrett, *et al.* to motivate one skilled in the art to combine the two references to teach or disclose a pump with an acoustical sensor for detecting the sound of a wear part on that pump. The text from Miller essentially describes venturi pressure sensors that detect fluid flow in the case drain. The sensors are not detecting the behavior of any wear part on the pump, and specifically not detecting any acoustical signals. There is no argument from the Examiner regarding how detecting fluid rate motivates one skilled in the art to add an "acoustic vibration sensing apparatus having a light transmitting fiber" to a pump.

In addition, there is no indication in either reference describing how replacing the venturi sensors of Miller, which detect fluid pressure, with a flextensional hydrophone of Garrett, which detects acoustical signals, will aid in calculating the flow rate of fluid in the case drain. If the proposed modification or combination of the prior art changes the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). In other words, if the flow meter of Miller is going to be replaced, it must be replaced with something that detects fluid flow. The object of Miller is to detect fluid pressure moving through the pump, not detecting a noise that a structure on the pump makes. The object of Garrett, *et al.* is the description of a new type of flextensional hydrophone. Substituting an acoustic sensor with a flow meter changes the principle of operation of the prior art. In contrast, the apparatus or method of the present invention is illustratively directed to the use of an acoustical sensor to detect the noise a part makes.

Moreover, it is notable that the specification of Garrett, *et al.* describes no utility for its flextensional hydrophone. Specifically, there is no disclosure describing what the intended use is for a flextensional hydrophone. This is not to say that the flextensional hydrophone patent has no utility, rather, its utility is presumed known only to those skilled in the

art of flextensional hydrophones. The Garrett, *et al.* patent, however, does not teach or disclose to those not skilled in the art of flextensional hydrophones how to adapt the same for use with a pump. Such disclosure would be needed for those skilled in the art of conventional pumps. Accordingly, this absence of motivation to combine the references to disclose the claimed invention means that the combination fails to establish a *prima facie* case that the claimed invention is obvious.

With respect to the claims, independent apparatus Claims 31, 39 and 51 are directed to a pump which comprises at least one wear part and at least one sensor for sensing at least one acoustical signature signal of the pump. For the foregoing reasons, the combination of Miller and Garrett, *et al.* is not believed to render these claims obvious. Similarly, independent Claims 17 and 48 are directed to a method of sensing an acoustical signal from a wear part or a pump, which, too, is not rendered obvious by the combination of Miller and Garrett, *et al.* Still further, the combination does not make obvious sensing at least one operating behavior of the pump as recited in independent Claim 1, also for the foregoing reasons.

VII. The Combination of Miller and Garrett, *et al.* is Improper Hindsight Reconstruction

The Examiner also asserts that the combination of Miller and Garrett, *et al.* is a proper hindsight reconstruction to produce the claimed invention. In the Advisory Action mailed June 27, 2003, with respect to the allegation of improper hindsight reasoning, the Examiner stated that:

> it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper.

This is the language found in MPEP § 2145 for arguing against an alleged improper rationale for combining references. The language requires that "only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not

include knowledge gleaned only from the applicant's disclosure." Such reconstruction is, thus, only proper if the Examiner can demonstrate that the knowledge to combine a pump with an acoustic sensor was known by those skilled in the art and not by the applicant's disclosure. In an Advisory Action mailed June 27, 2003, the Examiner supported a position of proper hindsight reconstruction by defining the "level of ordinary skill at the time the claimed invention was made" through the teachings of Garret, *et al.* The Examiner explained that:

> In this case, Garrett invention is for vibration sensing purpose (Col. 1, Lines 5-7), and vibration analysis knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper.

Again, column l, lines 5-7, merely describe the "Field of the Invention" of Garrett, *et al.* relating to an acoustical vibration sensing apparatus that has a light transmitting fiber. This "Field of the Invention" description, however, in no way indicates how flextensional hydrophones relate to the art of pumps. Most patents, with the possible exception of pioneer patents, are related to some known field of technology. This is evidenced by all patents having a "Field of the Invention" section. As is the case with all patents, the "Field of the Invention," in and of itself, means nothing with respect to obviousness. The "Field of the Invention" of seismographs is, too, related to "vibration sensing" but that, in and of itself, does not enable one skilled in the art of pumps to be motivated to combine a seismograph with a pump.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). In other words, there must be some teaching, suggestion, or motivation in Garrett, *et al.* or Miller to replace the flow meter with an acoustical sensor, and not merely because flextensional hydrophones are known to those skilled in the art of flextensional hydrophones. Garrett, *et al.*, however, simply teaches the existence of a new type of flextensional hydrophone. Nowhere in Garrett, *et al.* does it teach the reader what flextensional hydrophones are used for,

or how they may combine with other structures, like a pump, nor how the flextensional hydrophone would be adopted or used with the pump. Clearly, the Garrett, *et al.* patent is written for those skilled in the art of flextensional hydrophones, and not for those skilled in the art of pumps. Moreover, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Therefore, even if Miller and Garrett, *et al.* can be combined, for the foregoing reasons, there is clearly no motivation to make the combination.

Furthermore, it is noted that the claimed invention has been subject to two separate patentability searches by the Examiner. The May 21, 2003 Final Office Action is, in fact, the second Final Office Action issued in this case. The first Final Office Action, mailed June 25, 2002, was withdrawn, so a second search could be conducted on this claimed invention. (See the Interview Summary Report mailed September 24, 2002.) The best art that was found as a result of both patentability searches was a pump disclosing a flow meter, etc. If acoustical sensors or other structural behavior sensors were known in the art of pumps, it would be expected that several references would describe such combinations. No such references were found, however. The patent record has, thus, not evidenced that those skilled in the art at the time the claimed invention was filed were knowledgeable about acoustical sensors and their ability to detect the sound of wear parts. As a result, the only knowledge that exists to combine the disclosures of Miller and Garrett, *et al.* to produce a pump with an acoustical sensor must have come from the Appellant' disclosure. Accordingly, the combination was made only through knowledge of the Appellant' patent application, making it, thus, an improper hindsight reconstruction.

For the foregoing reasons, the combination of Miller and Garrett, *et al.* is improper hindsight with respect to independent apparatus Claims 31, 39 and 51. Similarly, the same is the case with respect to independent Claims 1, 17 and 48.

VIII. The Combination Renders the Prior Art Unsatisfactory for its Intended Purpose as Well as Fails to Establish a Likelihood of Success When Making Such a Combination.

In addition to being improper hindsight reconstruction and failing to provide motivation to combine, the combination of Miller and Garrett, *et al.* also fails to satisfy other criteria required for establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, not only must there be some suggestion or motivation to combine the references' teachings, as previously discussed, there must also be a reasonable expectation of success that the references can be combined. Furthermore, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See also MPEP § 2143 through § 2143.03. No disclosure in Garrett, *et al.* or in Miller teaches or suggests how an acoustical sensor can be added to a pump. There is no teaching as to what part on the pump of Miller the acoustical sensor of Garrett, *et al.* will detect without having the benefit of the present disclosure. In addition, the flow meter detects flow of the fluid, which has nothing to do with detecting the behavior of a specific structural component of the pump. In addition, replacing a flow meter with an acoustical sensor is inappropriate since the acoustical sensor does not detect fluid flow. There is no reason one skilled in the art of pumps would seek the art of flextensional hydrophones to replace a venturi sensor.

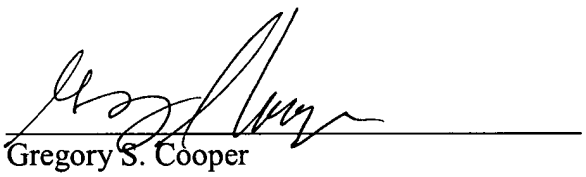
Furthermore, the combination of Miller and Garrett, *et al.* would render the prior art unsatisfactory for its intended purpose. (See, also, MPEP § 2143.01.) Replacing the flow meter with a flextensional hydrophone would render the pump inoperable to the extent that it could no longer detect flow rate. The flextensional hydrophone does not measure the flow rate of fluid. Thus, the intended purpose of measuring fluid flow in Miller would be lost.

Accordingly, no suggestion or motivation to make the proposed modification to produce the claimed invention exists.

IX. CONCLUSION

For the reasons set forth above, Appellant respectfully traverses the Examiner's rejections of Claims 1-4, 6-12, 15-22, 25-28, 30-35, 37-39, 47, 48, 50, 51 and 53 . Reversals of each of the rejections entered by the Examiner are respectfully requested.

Respectfully submitted,



Gregory S. Cooper
Reg. No. 40,965
Direct Line (260) 425-4660

APPENDIX A

CLAIMS ON APPEAL

1. A method of facilitating maintenance of a pump comprising the following steps:

providing a pump including wear parts, a processor and memory;

sensing at least one structural operating behavior of the pump indicative of the operation of the pump;

generating operational data reflective of the sensed operating behavior;

storing the generated operational data in the memory;

storing parts identification data identifying wear parts of the pump in the memory;

storing at least one predetermined level of operational information;

operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part.

2. The method of claim 1 further comprising the following step:

repeating the step of

sensing at least one operating condition of the pump indicative of the operation of the pump,

generating operational data reflective of the sensed operating condition,

storing the operational data in the memory, and thereafter updating the stored operational data in dependent response to the sensing of the at least one operating condition.

3. The method of claim 1 further comprising the following steps:

retrieving parts identification data for the at least one selected part from the memory, and

outputting information identifying the at least one part whose replacement or repair is desired.

4. The method of claim 1 wherein the pump comprises a pumping element and the structural operational behavior of the sensing step is a physical integrity of the pumping element of the pump.

5. The method of claim 4 wherein the pumping element is a diaphragm.

6. The method of claim 2 wherein the pump comprises a check valve and the operational condition of the sensing step is a reverse fluid flow through the check valve.

7. The method of claim 1 further comprising the following step:

providing at least one sensor.

8. The method of claim 2 further comprising the following step:

operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of modifying the operation of pump.

9. The method of claim 8 wherein the operational condition of the sensing step is an output flow rate of the pump.

10. The method of claim 8 wherein the operational condition of the sensing step is a cycle rate of the pump.

11. The method of claim 8 wherein the operational condition of the sensing step is an acceleration of a cycle rate of the pump.

12. The method of claim 1 wherein the pump comprises a pumping element and the structural operational behavior of the sensing step is a temperature of the pumping element of the pump.

13. The method of claim 12 wherein the pumping element is a diaphragm.

14. The method of claim 8 wherein the pump is an air operated diaphragm pump comprising an air chamber and the operational condition of the sensing step is a back pressure in the air chamber.

15. The method of claim 8 wherein the pump comprises at least one pumping chamber and the operational condition of the sensing step is filling rate of the pumping chamber.

16. The method of claim 8 wherein the operational condition of the sensing step is a suction pressure of the pump.

17. A method of modifying an operation of a pump comprising the following steps:

providing a pump, a processor and memory;

sensing at least one acoustical signal generating operating condition of the pump indicative of the operation of the pump with an acoustical signature sensor;

generating operational data reflective of the sensed operating condition;

storing the generated operational data in the memory;

storing at least one predetermined level of operational information;

operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of modifying the operation of pump.

18. The method of claim 17 further comprising the following step:

repeating the steps of

sensing at least one operating condition of the pump indicative of the operation of the pump;

generating operational data reflective of the sensed operating condition,

storing the operational data in the memory, and thereafter

updating the stored operational data in dependent response to the sensing of the at least one operating condition.

19. The method of claim 18 wherein the operational condition of the sensing step is an output flow rate of the pump.

20. The method of claim 18 wherein the operational condition of the sensing step is a cycle rate of the pump.

21. The method of claim 18 wherein the operational condition of the sensing step is an acceleration of a cycle rate of the pump.

22. The method of claim 18 wherein the pump comprises a pumping element and the operational condition of the sensing step is a temperature of the pumping element of the pump.

23. The method of claim 17 wherein the pumping element is a diaphragm.

24. The method of claim 18 wherein the pump is an air operated diaphragm pump comprising an air chamber and the operational condition of the sensing step is a back pressure in the air chamber.

25. The method of claim 18 wherein the pump comprises at least one pumping chamber and the operational condition of the sensing step is a filling rate of the pumping chamber.

26. The method of claim 18 wherein the operational condition of the sensing step is a suction pressure of the pump.

27. The method of claim 18 wherein the pump comprises wear parts and the method further comprises the following steps:

storing parts identification data identifying wear parts of the pump in the memory; and

operating the processor to compare the stored predetermined level to the stored operational data and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part.

28. The method of claim 27 wherein the at least one wear part is a pumping element and the operational condition of the sensing step is a physical integrity of the pumping element.

29. The method of claim 28 wherein the pumping element is a diaphragm.

30. The method of claim 27 wherein the at least one wear part is a check valve and the operational condition of the sensing step is a reverse fluid flow through the check valve.

31. A pump comprising:

at least one wear part, a processor and memory, at least one acoustical sensor for sensing at least one operating condition of the pump, and a display,

the acoustical sensor communicating operational data reflective of the sensed operating condition to the processor, the processor storing the operational data in the memory and updating the stored operational data upon receipt of new operational data from the sensor,

the memory also comprising parts identification data identifying wear parts of the pump and at least one predetermined level of operational information,

the processing comparing the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part.

32. The pump of claim 31 wherein the processor is in communication with a stand alone computer.

33. The pump of claim 31 wherein the computer is a hand held computer.

34. The pump of claim 31 wherein the processor of the pump is linked to at least one other processor of another pump.

35. The pump of claim 31 wherein the wear part is a pumping element.

36. The pump of claim 35 wherein the pumping element is a diaphragm.

37. The pump of claim 31 wherein the wear part is a check valve and comprises a sensor that senses a reverse fluid flow through the check valve.

38. The pump of claim 31 wherein the processor further compares the stored predetermined level to the stored operational data and in dependent response thereto outputs information as to the desirability of modifying the operation of pump.

39. A pump comprising:

at least one wear part, a processor and memory, at least one sensor for sensing at least one acoustical signal generating operating condition of the pump, and a display,

the sensor communicating operational data reflective of the sensed operating condition to the processor, the processor storing the operational data in the memory and updating the stored operational data upon receipt of new operational data from the sensor,

the memory also comprising parts identification data identifying wear parts of the pump and at least one predetermined level of operational information,

the processor comparing the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part modifying the operation of the pump.

47. The pump of claim 39 wherein the processor compares the stored predetermined level to the stored operational data and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part.

48. A method of facilitating maintenance of a pump comprising the following steps:

providing a pump including wear parts, a processor and memory;

sensing at least one acoustic signature signal of the pump indicative of the operation of the pump;

storing the sensed signature signal in the memory;

storing parts identification data identifying wear parts of the pump in the memory;

storing at least one predetermined signature signal;

operating the processor to compare the stored predetermined signature signal to the stored sensed signature signal and in dependent response thereto outputting information as to the desirability of replacing or repairing at least one selected wear part.

50. The method of claim 48 wherein the signature signal is a vibratory signal.

51. A pump comprising:

at least one wear part, a processor and memory, at least one sensor for sensing at least one acoustical signature signal of the pump, and a display,

the sensor communicating the sensed signature signal to the processor, the processor storing the signature signal in the memory and updating the stored signature signal upon receipt of a new signature signal from the sensor,

the memory also comprising parts identification data identifying wear parts of the pump at least one predetermined signature signal,

the processor comparing the stored predetermined signature signal to the stored signature signal and in dependent response thereto outputting information to the display as to the desirability of replacing or repairing at least one selected wear part.

53. The pump of claim 51 wherein the signature signal is a vibratory signal.